REMARKS

The Office Action of June 23, 2008, has been reviewed and the comments therein carefully considered. The specification and claims of this application have been amended. More specifically, the specification has been amended to correct two minor errors as suggested in the Office Action. Claim 1 has been amended to incorporate therein the language previously appearing in claim 3, and claim 3 has been cancelled. Claims 4-8 have been added by this Amendment. Support for claim 4 can be found beginning with the first full paragraph on page 12 of the application as filed, support for claim 5 can be found beginning with the first full paragraph on page 14 as filed and in Fig. 2, and support for claim 6 can be found beginning with the first full paragraph on page 20 as filed as well as in Fig. 2. Support for claims 7 and 8 can be found in original claim 2, as well as in Fig. 2, which shows heating temperatures up to 600°C; page 15, which discusses heat treatment temperatures of 600 and 900°C; and page 19, which discusses a heat treatment temperature of 700°C. Thus, no new matter has been added and claims 1, 2 and 4-8 are currently pending.

In the June 23, 2008 Office Action, claims 1-3 were rejected under 35 U.S.C. §102(b) as being anticipated by United States Publication No. 2003/0183895 to Okamura et al. Applicants respectfully traverse this rejection.

Okamura is directed to a semiconductor device with a SiC semiconductor substrate (1), an epitaxial layer (10), a surface molybdenum metal layer (3) joined to a silicon surface (11) of the SiC substrate (1), and a surface metal layer (5) formed as a surface electrode on a surface of the molybdenum metal layer (3). Another molybdenum metal layer (2) is also formed on the carbon surface (12) of the SiC substrate (1). The device is subjected to heat treatment of between 300°C to 500°C in order to create an ohmic junction at the interface of the carbon surface (12) and a Schottky junction at the interface of the silicon surface (11). Okamura does not discuss a process of producing a Schottky junction type semiconductor device where the height of the Schottky barrier is controlled in the range of 1.0 to 1.3 eV while the n-factor is maintained at a value of 1.05 or lower.

The Office Action contends that Okamura discloses a process for

producing a Schottky junction type semiconductor where the height of the Schottky barrier is between 1.0 and 1.3 eV. As support, the Office Action points to paragraph 77 of Okamura where it states that the Schottky barrier diode has a forward rise voltage of 1.3 V/1A. However, Applicants disagree that this disclosure in Okamura satisfies the limitation on the Schottky barrier height in claim 1. The forward rise voltage disclosed in Okamura actually represents the potential difference between electrodes at both ends of a diode when a current of 1A is applied to the diode. Importantly, this value is the sum of the Schottky barrier voltage and the voltage derived from resistance components of the diode. Therefore, it is far from certain from this disclosure whether the Schottky barrier height in Okamura actually falls within the range of 1.0 to 1.3 eV. Furthermore, Okamura fails to discuss n-factor values at all, much less n-factor values within the specific range recited by Applicants. Thus, in light of these deficiencies in the Okamura document, Applicants respectfully submit that the pending claims are patentable over Okamura.

Newly added claim 4 further defines claim 1 by stating that an ohmic electrode is formed through a heat treatment before the Schottky electrode is formed. In contrast, Okamura discloses a method of manufacturing a semiconductor including a heat-treatment step for simultaneously heat-treating the ohmic metal layer and the Schottky metal layer in order to shorten the manufacturing process. (Okamura, paragraph 37).

Newly added claim 5 recites that the Schottky electrode is made of molybdenum and the height of the Schottky barrier is increased by the heat treatment step. Newly added claim 6 specifies that the Schottky electrode is made of tungsten and the height of the Schottky barrier is decreased by the heat treatment step. Okamura fails to disclose or suggest this subject matter.

Claims 7 and 8 further define claims 5 and 6, respectively, by specifying that the heat treatment temperature is in the range of 600 to 1200°C. Okamura, on the other hand, discloses the much lower heat treatment temperature of 300 to 500°C. (Okamura, paragraph 31). In fact, the preferred range in Okamura, 350 to 450°C, is even further from the range recited in the claims. (Okamura, paragraph 43). Additionally, Okamura actually teaches away from the range in claims 7 and 8 by suggesting that setting the upper heat temperature limit below

500°C, such as at 450°C, eliminates the possibility that the operating characteristics of the semiconductor device are affected by the heat treatment temperature during manufacturing. (Okamura, paragraph 43).

For all of the foregoing reasons, Applicants submit that claims 1, 2 and 4-8 are patentable over the cited documents and in condition for allowance. Accordingly, reconsideration of the outstanding rejections and allowance of pending claims 1, 2 and 4-8 are respectfully requested.

Respectfully submitted,

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